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# Generative AI in Academic Writing: Exploring ESL students' strategies and performance

Sofwah Md Nawi\*, Noridah Sain, Suhaili Mohd Yusof, Puteri Nur Hidayah Kamaludin

\*Corresponding Author

Academy of Language Studies, Universiti Teknologi MARA Cawangan Johor, Segamat, Malaysia

sofwah@uitm.edu.my, noridahs@uitm.edu.my, suhailiyusof@uitm.edu.my, puteri523@uitm.edu.my
Tel: +6079352000 Ext: 195

#### **Abstract**

Easy access to Generative Artificial Intelligence (GenAl) technologies has enabled tertiary students to accomplish writing tasks in the English language regardless of their competencies. However, the lack of formal instructions in higher education curricula leaves many unanswered questions regarding how effectively students use the tools to their advantage. To identify how tertiary students incorporate GenAl into their academic writing and the effects on their output, this exploratory case study investigated GenAl-assisted writing strategies among 13 university students in Malaysia. A thematic analysis of their self-reported usage of ChatGPT revealed six key strategies that influence their writing performance.

Keywords: academic writing; ESL; Generative AI

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#### 1.0 Introduction

The upsurge of Generative Artificial Intelligence (GenAl), driven by large language learning models (LLMs), has reshaped the educational environment as it generates tailored learning resources and offers adaptive feedback to enhance learning outcomes (Nguyen et al., 2024b). In English language classrooms, GenAl usage has been shown to improve academic writing skills, with empirical and qualitative studies reporting gains in performance among students who received GenAl-supported instruction (Rahman et al., 2022; Song & Song, 2023).

Despite these benefits, GenAI induces apprehensions among academicians. The absence of clear policies on its integration into higher education, particularly in Malaysia, compounds uncertainty around its responsible use. Although studies on GenAI surged in studies in 2023 following the release of ChatGPT (Ogunleye et al., 2024), much remains unknown about how it meets learners' cognitive and academic needs (Ortega-Ochoa et al., 2024). Moreover, ethical concerns such as algorithmic bias and potential misuse of Algenerated content require urgent attention (Perkins et al., 2024). Therefore, there is a pressing need for educational institutions to equip students with digital literacy and critical thinking skills to ensure responsible engagement with GenAI (Su & Yang, 2023; Masrek et al., 2024).

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Knoth et al. (2024) define current students as non-experts who lack formal instruction in GenAl and LLMs. Although these students have developed distinct learning styles due to their familiarity with technology, they lack formal instruction on assessing the accuracy, reliability, and potential biases inherent in Al-generated content (Nguyen et al., 2024b). For English as a Second Language (ESL) students, sufficient language proficiency is essential, not only to understand and refine ChatGPT responses but also to craft effective prompts that generate reliable content (Salinas-Navarro et al., 2024). As Crompton et al. (2024) emphasise, students must be taught both technical and ethical dimensions of GenAl to navigate academic work responsibly.

In response to these gaps, this study explores how GenAI, specifically ChatGPT, can be purposefully integrated into the ESL academic writing classroom. As ChatGPT continues to capture global academic interest (Ogunleye et al., 2024), understanding its application in ESL classrooms is both timely and necessary. The objectives are to investigate how ESL students use ChatGPT for academic writing and how their interaction strategies influence the quality of their written output. The following research questions are formulated to meet the objectives:

- 1. What strategies do ESL students employ when using ChatGPT for academic writing?
- How do the students' strategies in using ChatGPT affect their writing performance?

#### 2.0 Literature Review

# 2.1 ESL academic writing process and GenAl

Academic writing is crucial for ESL students at the tertiary level since it is a widely used form of assessment (Mdodana-Zide & Mafugu, 2023). To produce well-organised and clear academic texts, ESL students need to undergo comprehensive routines. Therefore, this study is informed by Flower and Hayes' cognitive process theory of writing (1981), which views writing as a problem-solving activity involving planning, translating, and reviewing. The model in Figure 1 demonstrates a range of cognitive activities that occur recursively.

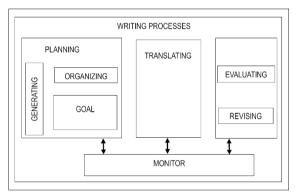


Fig. 1: Writing Processes (Source: Flower & Haves. 1981)

ESL students who engage in brainstorming, drafting, and revising activities tend to have a more developed cognitive approach to writing, leading to effective writing outcomes (Mitchell et al., 2023). Conversely, those with less engagement in these activities might struggle with the cognitive processes and produce academic texts of lower quality. For Malaysian ESL undergraduates, a study by Lee et al. (2015) indicates that even though students employ cognitive strategies in writing, they prioritise generating content over revising content and organisation, suggesting a surface-level engagement.

The need for scaffolding, such as collaborative writing, would help reduce cognitive load and improve writing efficiency (Jiang & Kalyuga, 2022). With GenAl, students who experience cognitive barriers can take advantage of the technology. This is particularly relevant in academic writing, where the ability to manage cognitive load can significantly impact the quality of the final output. Given that previous studies have demonstrated how GenAl support cognitive processes such as brainstorming (Lingard, 2023) or paraphrasing and proofreading (Rahman et al., 2022; Wang & Guo, 2023), using GenAl to streamline certain aspects of the writing process can help students to free up cognitive resources to focus on higher-level tasks like critical analysis and argumentation.

# 2.2 Regulating the use of GenAl

While GenAl can enhance ESL students' writing effectiveness, over-reliance on it may impede the development of essential writing and critical thinking skills (Song & Song, 2023). A balanced approach is therefore needed—one where GenAl complements rather than replaces cognitive processes in academic writing. Insights from two recent studies shed light on effective human-Al interaction. Nguyen et al. (2024a) found that students who engaged in highly iterative and interactive writing processes with GenAl performed better in their writing tasks. Similarly, Zheng et al. (2024) reported that students perceived GenAl in various roles—tool, teammate, or expert—and that these perceptions shaped their self-regulated learning strategies and their desire for fair recognition of human versus Al contributions in assessments.

These findings highlight the need to distinguish clearly between human- and Al-generated content to manage GenAl reliance responsibly. Addressing this, Perkins et al. (2024) introduced the Al Assessment Scale (AlAS) framework (Figure 2), which outlines five levels of GenAl involvement in completing academic tasks. The framework supports flexible integration by clarifying the type and extent to which GenAl assistance is permitted. This helps educators uphold academic integrity by setting transparent boundaries between human input and Al support. Overall, implementing structured frameworks and promoting strategic GenAl use can maximise its benefits while safeguarding the development of students' independent academic skills.



Fig. 2: AIAS Framework (Source: Perkins et al. 2024)

While global discussions on AI in education continue to expand, there is still a noticeable gap in research on how ESL learners in Malaysian universities use GenAI for academic writing. Specifically, limited studies (e.g. Rahman et al., 2022) have explored how these students manage their use of such tools, document their processes, and address ethical concerns in line with academic integrity standards. Therefore, this study seeks to address the gap in the literature by addressing the ethical, pedagogical, and assessment-related implications of GenAI use in student writing in Malaysian ESL higher education settings through the students' self-documentation of engagement with GenAI in academic writing tasks.

# 3.0 Methodology

This exploratory case study employed purposive sampling to involve 13 final-semester students from an Academic Writing course (ELS302) in the Diploma in English for Professional Communication Programme at a Malaysian public university. These participants were drawn from a single cohort of 19 final-semester diploma students enrolled in the March-August 2025 semester. This course requires students to produce a 1,000–1,500-word essay as their capstone written project. All students were invited to participate; 13 volunteered (68% response rate) and provided written consent for their essays and activity logs to be used in the study. With intermediate to high-intermediate English proficiency, they had received prior instruction in academic writing, digital literacy, and Al ethics, making them suitable for this study on GenAl-assisted writing.

Participants were given two weeks to complete the writing task with the assistance of ChatGPT, in composing an argumentative essay entitled "The Impact of Al-Powered Learning Tools on Students' Writing". This task, assigned during Weeks 12–14, followed 11 weeks of structured instruction in paraphrasing, synthesis, annotation, and outlining. The essay length was chosen to ensure sufficient argumentative depth while remaining manageable for content analysis. Essays were graded using the Common European Framework of Reference (CEFR) 6-point writing scale (A1-C2) and checked for plagiarism with Turnitin. This international writing scale was chosen since its descriptors are widely recognised in ESL contexts and align closely with the course learning outcomes. Two trained raters (both senior lecturers) independently scored each essay using the official CEFR descriptors and a standardised rubric adapted for the Academic Writing course. Discrepancies were resolved through discussion until a consensus was reached.

To capture the students' engagement with ChatGPT, they were also asked to record an activity log of their writing process. Their self-recorded activities were analysed qualitatively using Braun and Clarke's (2019) six-phase thematic analysis to identify key writing strategies. Although the cohort size is small relative to larger intakes in other semesters (which limits the generalisability of the findings), capturing 68% of the class provides a robust snapshot of this population. In exploratory thematic analyses (such as Braun and Clarke's approach), samples of 10–15 participants are widely regarded as adequate to achieve thematic saturation when data are rich and homogeneous (Guest et al., 2006). The qualitative data was primarily used to answer the first research question, and the quantitative data was used to address the second research question. To address how the students' strategies in using ChatGPT affect their writing performance (Research Question 2), each essay's CEFR band score was summarised in a descriptive data table according to B1–C1 categories. This approach highlights overall proficiency trends consistent with the study's exploratory intent and modest sample size.

# 4.0 Findings

#### 4.1 Strategies for using ChatGPT for academic writing

Thematic analysis of the activity log in Table 1 suggested six main categories of strategies employed by the students to utilise ChatGPT's assistance in the three writing processes.

Table 1. Gen-Al-assisted writing strategies		
Writing Process	Categories of Strategies	
Planning	Prompt Development and Refinement	
-	Thesis Formation and Structure Planning	
Translating	Writing and Revision	

Research and Integration of Sources

Revising • Feedback and Improvement

Ethical Considerations and Academic Integrity

In the planning stage, students used ChatGPT to generate ideas for their argumentative essay by developing and/or refining prompts and forming the thesis statement. Most prompted ChatGPT directly using the task instructions, e.g. "List down important points for an essay titled 'How AI Tools help students with writing" or rephrasing them as a question e.g. "How does AI negatively impact students' writing?". They then evaluated ChatGPT's responses, selecting relevant points to form thesis statements and essay outlines. While most students chose to formulate the thesis statement themselves, three students prompted ChatGPT to do it for them. Student 1 reasoned that he preferred forming the thesis statement on his own because "the AI cannot give you one that you are satisfied with."

In the translating stage, the students demonstrated the drafting and redrafting process with varying degrees of reliance on ChatGPT. Some prompted ChatGPT to produce the essay based on the thesis statement (e.g. "I then ask ChatGPT to write body paragraphs using the three points and their respective supporting arguments"). Others wrote the essay based on their evaluation of ChatGPT's generated content. While many reported a linear approach to interacting with ChatGPT, one student showed an iterative, highly interactive engagement. Student 11 wrote: "Based on the evaluation of ChatGPT's response, I write my body paragraphs, incorporating both my original ideas and those suggested by ChatGPT. If there are specific elaborations or examples I want to include that were not addressed in ChatGPT's initial response, I make a follow-up request. To enhance the elaboration in my essay, I request ChatGPT to provide more detailed explanations for particular sentences or sections that need further development." Students also performed supplementary research and incorporated citations to meet academic writing conventions such as finding suitable references "to enhance credibility" (Student 6). Some used ChatGPT to paraphrase or personalise the content, such as Student 5 who prompted ChatGPT to rewrite the paragraphs "in a formal academic tone."

In the revising stage, 8 of 13 students reported using ChatGPT to seek feedback and improvement. Student 11 prompted ChatGPT by giving specific instructions to "improvise proofread edit, (...) add elaborations in between sentences to ensure each sentence complete to connect with one another (sic) and flow smoothly" while others input a short and simple prompt such as "proofread the essay". Others chose to proofread the work themselves instead of relying on ChatGPT. While many students ended their writing process with proofreading and editing, one student took the initiative to use other Al tools, i.e., Quillbot, for proofreading, and Al Detector to analyse potential plagiarism. Others did not report any form of ethical considerations. Overall, for academic integrity, students only reported forming citations and references as their strategies.

#### 4.2 Impact of strategies on students' GenAl-assisted writing performance

To answer the second research question, the participants' essays, which were graded based on the CEFR band, are presented in the table below.

Table 2. Students' GenAl-assisted writing performance (n=13)

Student	Marks	Performance (CEFR Band)
1	10	B1 (independent user)
2	16	B2 (independent user)
3	8	B1 (independent user)
4	17	B2 (independent user)
5	8	B1 (independent user)
6	15	B2 (independent user)
7	16	B2 (independent user)
8	16	B2 (independent user)
9	22	C1 (proficient user)
10	17	B2 (independent user)
11	24	C1 (proficient user)
12	8	B1 (independent user)
_13	9	B1 (independent user)

Based on Table 2, the argumentative essays completed by 13 students revealed a diverse range of scores (out of 30 marks), with the majority falling within the B1 and B2 bands. Five students were categorised as B1 users, indicating that while they can produce simple texts on familiar topics, their essays lack the depth and complexity expected in academic writing. The activity logs indicated heavy reliance on ChatGPT for grammar checking, idea generation and sample paragraph construction. This overreliance may have hindered their ability to incorporate their voice, personal stance, and critical thinking, resulting in essays mirroring ChatGPT's suggestions. Their ability to integrate citations effectively was either absent or lacking, which further affected their marks.

In contrast, eight students achieved a B2 band, demonstrating a higher understanding of argumentative writing with ChatGPT's assistance. These students employed ChatGPT to brainstorm ideas, outline, refine, and proofread their essays while still integrating their voice and personal insights. Some demonstrated a more linear approach by giving simplified prompts, while others struggled to synthesise information effectively in their writing.

Lastly, two students in the C1 band demonstrated exceptional fluency and coherence in using ChatGPT for basic assistance, engaging with the tool as a collaborative partner in drafting and revising their argumentative essays. Student 11 effectively and meaningfully interacted with ChatGPT to achieve her task, while Student 9 did not provide in-depth reporting of her ChatGPT usage. For the final output, both students effectively presented their arguments and demonstrated critical thinking skills, with minimal

resemblance to the feedback provided by ChatGPT, showcasing their ability to synthesise GenAl content and external source materials with their analytical capabilities.

#### 5.0 Discussion

#### 5.1 Addressing the gap in understanding ESL students' GenAl-assisted writing strategies

The study highlights how ESL students strategically used ChatGPT in their academic writing processes, revealing both the benefits and challenges of GenAl assistance. Through the students' self-reported activities, the study was able to draw a parallel comparison with past studies of how GenAl supported students in different writing processes. The six categories of GenAl-assisted strategies identified—spanning the planning, drafting, and revising stages—reflect varied levels of cognitive engagement. These findings reinforce the value of an iterative writing process (Flower & Hayes, 1981) and align with prior research (Nguyen et al., 2024a; Wang & Guo, 2023) showing that students who engaged with ChatGPT as a collaborative tool produced stronger outcomes.

Higher-scoring students used ChatGPT across multiple stages to refine ideas and enhance clarity, while lower-proficiency users relied on simple, directive prompts. This linear usage suggests a lack of strategic depth and may be shaped by students' limited GenAl literacy or language proficiency. As Knoth et al. (2024) note, the ability to generate effective prompts significantly affects the quality of Al-generated responses.

The study also found that despite showing improvements in linguistic accuracy, some students' work lacked critical depth. In Malaysia's exam-oriented ESL context—where students often receive limited training in process-based writing—this reflects broader issues in writing strategy instruction (Lee et al., 2015) and access to digital literacy development (Knoth et al., 2024). Notably, few students considered the ethical implications of using AI, indicating a gap in awareness about academic integrity (Nguyen et al., 2024b). Without proper guidance, GenAI may unintentionally widen existing achievement gaps. Institutions should consider embedding GenAI literacy within writing courses and offering guided practice to help students meaningfully harness these tools while maintaining ethical academic standards (Nguyen, 2025).

# 5.2 Pedagogical implications

These findings call for a rethinking of academic writing instruction in GenAl-mediated classrooms. Educators must now extend their roles to include guiding students in prompt design, critical evaluation of Al-generated text, and ethical decision-making – skills central to digital and critical literacy. As Crompton et al. (2024) argue, writing competence must now encompass the ability to engage responsibly and strategically with Al tools. Malaysian ESL educators are especially well-placed to shape how students integrate GenAl into their learning. Structured interventions such as Al-awareness modules, ethics-focused discussions, and reflective activities can support students' autonomy and help them maintain their voice. Embedding these components into the curriculum not only promotes responsible Al use but also prepares students for future academic and workplace demands. To implement this effectively, institutions must invest in professional development and adapt assessment practices to account for GenAl-supported writing while upholding academic standards (Nguyen, 2025).

This study, thus, proposes a potential framework for categorising students' self-regulated usage of GenAl, as shown in Table 3. Drawing inspiration from Perkins et al. (2024) AIAS framework, this four-level band for measuring GenAl usage in academic writing categorises students' reliance on GenAl tools throughout the writing process. Educators can use the framework to assess the impact on students' writing skills, critical thinking abilities, and overall academic integrity. Ultimately, both the AIAS and the four-band system advocate for a balanced integration of GenAl in education, fostering innovation and creativity while ensuring that academic integrity is maintained.

Table 3. Band for Measuring GenAl Usage in Academic Writing

Band	Level	Descriptor
1	Minimal AI assistance	GenAl tools are used sparingly, primarily for minor tasks such as spell-checking, grammar correction, or obtaining brief information.
2	Moderate Al assistance	GenAl tools are used for more substantial support, but significant control over the writing process is maintained.
3	Extensive AI assistance	The student relies heavily on GenAl tools throughout the writing process, using Al-generated content as a significant part of the final essay.
4	Predominant AI assistance	Gen Al tools are utilised to create a major part of the essay, with minimal personal input or revision.

Source: Adapted from AIAS framework (Perkins et al., 2024)

# 6.0 Conclusion & Recommendations

This exploratory study emphasises how ESL learners utilise GenAl in academic writing. The findings reveal that while the use of GenAl reduces the cognitive load during the planning, drafting and revising stages, uneven prompt engineering skills and language proficiency continue to mediate learning gains. Therefore, integrating a scale for the self-regulated use of GenAl will offer a diagnostic tool for monitoring ethical use and tailoring feedback. This ensures that GenAl augments existing academic skills rather than replaces them.

Together with the scale, encouraging compulsory declaration of AI usage and plagiarism checks for each assignment will also foster ethical usage.

The findings of the study are subject to several limitations. First, the sample size is small (n=13) and is drawn from a single programme, populated by Malaysian ESL undergraduates with intermediate to high proficiency levels. This restricts the generalisation of the result. Secondly, the exploratory case study design lacked a control group and relied on self-logged interactions, which invites recall and social desirability bias. Moreover, essays were produced with the help of a single version of ChatGPT and then graded using holistic CEFR bands, therefore providing limited insights into textual nuances and tool variability. Pairing the CEFR bands with an analytical assessment rubric would capture finer linguistic criteria. Future research should track the longitudinal effects of self-regulated GenAl usage on writing quality throughout one semester with a bigger sample size to yield more robust results and examine the sustainability of writing skill improvements. This could be used to develop enhancement strategies for GenAl literacy among students (e.g. prompt engineering training). In addition, future work should investigate how different GenAl models (e.g. Gemini and Claude) could influence genre-specific styles, learning curves, usage patterns and idea generation.

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# Paper Contribution to Related Field of Study

This paper offers practical contributions to the evolving landscape of ESL academic writing, particularly in leveraging GenAl to facilitate the writing process. The primary stakeholders and beneficiaries of this research include ESL students, who can enhance their writing skills and academic performance through more effective use of Al tools; educators, who can design better instructional practices and policies that integrate GenAl ethically and pedagogically; and academic institutions, which can develop support systems and digital literacy programs aligned with the realities of GenAl-enhanced learning. Additionally, the findings extend the current discourse on GenAl's role in education, thereby contributing to the broader field of educational technology and digital literacy.

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